

Expectation 6: Environmental Impacts on Human Health

The student will use concepts from chemistry, physics, biology, and ecology to analyze and interpret both positive and negative impacts of natural events and human activities on human health.

INDICATOR	OBJECTIVE(S)	CLARIFICATIONS	TEACHING RESOURCES
1. The student will identify and describe natural changes in the environment that may affect the health of human populations and individuals.	<ul style="list-style-type: none"> Identify internal and external processes of the earth that are natural events. Identify natural substances (such as radon, lead) and environmental conditions that may be harmful to humans. Describe and explain that natural systems may change to an extent that exceeds the limits of organisms to adapt naturally or humans to adapt technologically. 	<ul style="list-style-type: none"> Humans live at the interface between the atmosphere driven by solar energy and the upper mantle where convection creates changes in the earth's solid crust. Natural hazards include earthquakes, tsunamis, landslides, wildfires, volcanic eruptions, floods, storms. Some hazards such as earthquakes, volcanic eruptions and severe weather are rapid and spectacular; while others, such as stream channel movement, coastal erosion, and sedimentation are slow and progressive. 	<ul style="list-style-type: none"> Environmental Literacy Council Background information and lessons. <ul style="list-style-type: none"> Parts Per Million 1 Parts Per Million 2 <p>NSTA Module: Earthquakes, Volcanoes, and Tsunamis See <i>For the Classroom</i> for lessons and resources at the bottom of all pages.</p> <p>Ecological Forecasting- Harmful Algal Blooms HABs occur when algae, simple plants that live in the sea and form the base of the food web, produce toxic or harmful effects on people, fish, shellfish, marine mammals and birds.</p> <p>See Expectation Humans and Natural Resources Click here for original lesson source (MAC and PC) Dirty Mud Lesson - Dirty Mud Data Sediment Contamination Identify specific types of wetland habitats and land uses in a watershed; explain how data on chemical contaminants, land uses and habitat types can be integrated to develop restoration plans for environmental resources damaged by pollution; use a geographic information system to retrieve and analyze data about specific benthic marine habitats.</p> <p>Get to the Point! See Expectation Humans and Natural Resources Describe at least five sources of nonpoint source pollution runoff; at least three contaminants likely to be found in urban runoff, and discuss possible sources of these contaminants; discuss how bioassays may be used to measure toxicity, and describe three examples; compare and contrast toxicity tests and chemical analyses of potential contaminants, and explain how these may be used to identify areas affected by nonpoint source pollution; describe and discuss at least five actions that can be taken to reduce or eliminate contaminated runoff.</p> <p>The Seeds Tell the Story See Expectation Humans and Natural Resources</p> <p>Do You Want to Risk It? (13 pages, 209kb) Focus: How can coastal residents plan for the potential effects of natural hazards? Define, compare and contrast the terms "risk" and "vulnerability"; determine the history of natural disaster events for a given community; discuss the relative risk from natural hazard events for selected communities based on the history of such events.</p> <p>Are You Ready to Shake?</p>

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			<p>What can be done to reduce the vulnerability of coastal communities to the potential effects of earthquakes and their associated hazards? Explain the cause of earthquakes and tsunamis; define, compare and contrast the terms “risk” and “vulnerability”; describe potential mitigation activities for selected natural hazards</p> <p>Who Moved the Beach? Identify coastal erosion as a natural process, and explain how human activity can increase the risks associated with coastal erosion; identify options for reducing risks, discuss the advantages and problems associated with these options.; analyze and interpret beach elevation data, and make inferences from these data about the relative vulnerability of different beaches to coastal erosion.</p> <p>Thinkport Lessons</p> <ul style="list-style-type: none"> • It's a Bright and Beautiful Day (skin cancer) • Runaway Clones (mutations and cancer) • Lead—More Common than You Think (causes, symptoms and prevention of lead poisoning) <p>ArcLessons- Using GIS in the Classroom</p> <ul style="list-style-type: none"> • Spatial Analyst: Flooding Florida • West Nile Virus • Hurricane Season 2005 • The Southeast Asia Tsunami 2004 <p>National Geographic Society</p> <ul style="list-style-type: none"> • Volcano Hazards • Changing Nature's Course <p>Fire Wars (PBS) Fire and effects on ecosystem; Plants adapt to fire.</p> <p>Magma, Magma Everywhere Links mass extinctions with volcanic eruptions that split the continent of Pangea</p>
	a. Evaluate methods of assessing potential dangers and risks from human- induced activities.	<ul style="list-style-type: none"> • Hazards can present personal and societal challenges because misidentifying the change or incorrectly estimating the rate and scale of change may result in either 	<p>Digital Library of Earth System Education Excellent sources of lessons and materials</p> <p>★ The Toxicology Study Guide University of Guelph</p>

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<p>2. The student will analyze and explain that human activities, products, processes, technologies and inventions can involve some level of risk to human health.</p>	<p>b. Compare perceptions of benefits and risks of a given phenomenon versus the actual risk or benefit. c. Use a systematic approach to think critically about risks and benefits.</p> <ul style="list-style-type: none"> applying probability estimates to risks comparing probabilities to estimated personal and social benefits. Data must be used when establishing or monitoring quality standards related to the use of soil, water and air. 	<p>too little attention resulting in significant human costs or too much cost for unneeded preventative measures.</p> <ul style="list-style-type: none"> Risk analysis considers the type of hazard and estimates the number of people that might be exposed and the number likely to suffer consequences. The results are used to determine the options for reducing or eliminating risks. There are costs and trade-offs of various hazards, ranging from minor risk to a few people to major catastrophes with major risks to many people. The scale of events and the accuracy with which scientists and engineers can and cannot predict events are important considerations. 	<p>★ <u>Environmental Literacy Council</u> <u>Toxicology & Risk</u> <u>Antibiotic Resistance</u> <u>Epidemiology</u> <u>Microorganisms</u> <u>Persistent Organic Pollutants</u></p> <p><u>Coastal Decision-Making Tools</u></p> <p><u>NSTA Module Radioactive Waste</u></p> <p>SciNetLinks Risks and Benefits - Assess and weigh the risks and benefits associated with innovations in science and technology.</p> <p>Technological Advances in Health - How technology influences human existence by examining the benefits and risks of different biotechnological advances.</p> <p>The Effects of Pollution on Ecosystems EPA case study; discuss the limitations of current ecosystem assessment methods for establishing cause-and-effect relationships, especially for mixtures of chemicals in the environment.</p>
<p>3. The student will describe and explain that many changes in the environment designed by humans bring benefits to society as well as cause risks.</p>	<p>a. Analyze risks and benefits that are associated with:</p> <ul style="list-style-type: none"> use of chemical elements and compounds biological factors (pollen, viruses, parasites, bacteria) social factors (occupational safety and transportation) personal behaviors (smoking, dieting, drinking alcohol, some dietary habits) <p>b. Investigate factors that affect the length and quality of human life such as sanitation, diet, environmental conditions, genes,</p>	<p>a. Effects of some toxic substances show up right away but other effects show up years later.</p> <ul style="list-style-type: none"> Chemical and radiation exposure increase the rate of mutation in cell division and thus increase the chance of cancer. The incorrect use of antibacterial drugs can lead, by means of natural selection, to the spread of bacteria that are resistant to the drug. Some drugs mimic or block molecules involved in transmitting nerve or hormone signals and therefore disturb the normal operations of the brain and the body. 	<p>SciNet Links <u>Toxicology 1: Toxicology and Living Systems</u> <u>Toxicology 2: Finding the Toxic Dose</u> <u>Toxicology 3: Toxicology and Human Health</u></p> <p>★ Environmental Literacy Council http://www.enviroliteracy.org/category.php/5.html</p> <ul style="list-style-type: none"> <u>Conflict & Natural Resources</u> <u>Materials Use</u> <u>Transportation</u> <u>Waste Management</u> <p>Emerging and Reemerging Diseases Unit http://science-education.nih.gov/Customers.nsf/HSDiseases?OpenForm</p> <p><u>Chemicals and Human Health</u></p> <p><u>Thinkport Lessons</u></p>

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	<p>medical care and personal health behaviors.</p> <ul style="list-style-type: none">○ Sanitation measures such as the use of sewers, landfills, and safe food handling in controlling the spread of disease.○ Waste management including consideration of quantity, safety, degradability, and cost.○ New medical techniques and health care systems give people a better chance of staying healthy.		<p>http://www.thinkport.org/Classroom/connections/default.tp</p> <ul style="list-style-type: none">• The Price of Beauty (Cosmetic safety)• Evolving Resistance (development of antibiotic resistance in bacteria)• Every Breath you Take (respiratory system, asthma and air pollution)• Lunchtime (nutrition) <p>National Geographic Society Lessons</p> <ul style="list-style-type: none">• Alarming Frogs http://www.nationalgeographic.com/xpeditions/lessons/18/g912/hayes1.html• Low Level Nuclear Waste - A Geographic Analysis http://www.nationalgeographic.com/xpeditions/lessons/18/g912/nuclearwaste.html• Parasites http://www.nationalgeographic.com/xpeditions/lessons/18/g912/parasites.html
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